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cells there is a breaking down of some of the sporogenous cells — a condition of things not at all uncommon in the sporangia of certain pteridophytes. In general there is pretty close agreement between Ephedra and Welwitschia in the structure of the stamens. The pollen spores possess three nuclei, one of which usually is completely disorganized before the spores are shed. Of these three, this disorganized nucleus presumably represents a sterile prothallial cell, while the others are respectively tube nucleus and generative nucleus. Pearson found a single archesporial cell in the megasporangium. Although some of the stages were wanting, it was concluded that the archesporial cell divides into several cells, of which one becomes the megaspore. While numbers of young embryo sacs with free nuclei were observed, no dividing nuclei were seen. No vacuole was found in the young embryo sac, a condition, by the way, which is quite similar to what obtains in Peperomia.

The upper part of the nucellus becomes more or less disorganized, and as the prothallium grows there is the usual development of cell walls between the free nuclei; but these cells later become multinucleate, presumably by the division of the original nucleus. In the lower part of the sac there may be as many as twelve nuclei, in some of these cells. The number is less in those in the upper portion of the embryo sac. The upper prothallial cells grow out into tubes penetrating the nucellar cap in much the same way that the pollen tube would do. There are several nuclei in each tube, and these are all assumed to be potentially egg cells, but this has not been definitely proven. These tubes are not to be looked upon as archegonia, but each nucleus is considered to be an egg cell as in *Gnetumgnemon* and the peculiar tube is a special adaptation which is perhaps homologous with the whole apex of the prothallium of Gnetum, with which genus Pearson seems inclined to connect Welwitschia, although of course the relationship is rather a remote one. It is understood that Professor Pearson has been engaged in further studies on this most interesting plant and the result of these studies will be looked forward to with much interest by all students of the gymnosperms.

DOUGLAS HOUGHTON CAMPBELL.

Xerophily of the Gymnosperms.— Although the foliage of the conifers apparently presents adaptations to conditions of drought, Stopes (New Phytologist, 6:46–50. 1907) finds that at the present time the conifers occupy territory in which the rainfall is, in the main, plentiful. The generally accepted explanation of the occurrence of characters adapted to drought in environments in which they are unnecessary is that the present day plants have inherited these features from ancestral forms which grew under xerophytic conditions.[1] Miss Stopes, however, argues that in the conifers the xerophytic character is not to be regarded as an inherited adaptation but as correlated with the peculiarities of the conducting system of the stem. The gymnosperms have a much more primitive wood structure than the angiosperms and a much lower capacity for the conduction of water. It is this lower efficiency as conductors of water that necessitates the xerophytic character of the foliage,— not the environment. In other words, the author regards the xerophily of this group as phylogenetic, not adaptive.

With Miss Stope's general conclusion that the xerophily of the Coniferales is phylogenetic and not ecological, Moss agrees (New Phytologist 6 : 183–185. 1906),[2] but he feels that there is an untenable assumption running through the whole of her argument. This assumption is that the conifers in question are more pronounced xerophytes than the angiosperms with which they are ecologically associated. The xerophily of the gymnosperms is seen in the greatly reduced surface of the acicular leaf, whereas that of the angiosperms takes the form of a deciduous habit by which the transpiration is reduced to practically zero during the season of physiological dryness of the soil. He finds that in many instances deciduous angiospermous trees which are commonly regarded as mesophytes, extend into higher altitudes and latitudes than conifers which are generally classed as fine examples of xerophytes. Furthermore, he finds that among both conifers and dicotyledons, the deciduous species are the ones which extend the farthest north.

In view of these facts Moss would consider that the xerophily of the conifers is in no wise out of place in the environment of our mesophytic forests, for these are ecologically xerophytic for over half the year. He also holds that in the acicular leaf and the deciduous habit of some of the northern conifers we have more recent adaptations to the demands of a xerophytic habitat, thus accounting for the present wide distribution of this primitive group and its successful competition with phylogenetically higher forms.

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[1] Clements (Res. Meth. Ecol. 127, 1905) has suggested that the xerophytic characters of bog plants are not due to the "physiological dryness" of their substratum as proposed by Schimper and generally accepted, but to the inheritance of characters acquired when their ancestors were growing in xerophytic environments. He would therefore suggest the origin of stable adaptive structures which persist when the forms which had acquired them are subjected to ecological conditions of the most diverse type.

[2] Moss writes: "With her general contention, that the xerophily of the Coniferales is inherited and not acquired, I do not propose to deal, as Miss Stopes amply proves her case." The sentence is somewhat confusing, but by "inherited" he evidently means phylogenetic in the sense in which Miss Stopes uses the term while "acquired" is equivalent to her "ecological" or "inherited."

The arguments of both of these writers are suggestive, and much of the value of such discussions lies in the emphasis which they lay upon the necessity of approaching these problems with more precise methods than have hitherto been employed.

J. Arthur Harris

Notes on the Problem of Adaptation.— *The Stinging Property of the Giant Nettle tree.* The giant nettle tree, *Laportea gigas*, a native of Australia often attaining a height of over a hundred feet, has long been noted for the violence of its action. Its large juicy leaves are covered with numerous strong hairs or bristles which are filled with a powerful stinging fluid. If the leaves be lightly brushed these hairs penetrate and break in the skin, causing pain which gradually increases in severity and sometimes lasts for several days. A popular name for the Laportea is "mad tree." Petrie (Proc. Linn. Soc. N. S. W., 31: 530–545. 1906) presents a detailed account of the chemical composition and physiological action of the juices of this tree. He suggests five functions for the organic acids which are found in especial abundance, and states that "after considering the various functions in which organic acids take part, we cannot believe that the function of protection is the only one in this case."

Assimilatory Tissue in Mangrove Seedlings. Schimper was inclined to doubt the assimilatory function of the hypocotyl of mangrove seedlings but Goebel and Haberlandt acknowledge that they may perform this function. Carson (New. Phytologist, 6:178–183. 1907) describes the structure of the chlorophyll-containing tissue of the hypocotyl of Bruguiera and Rhizophora, and thinks it safe to assume that in the Rhizophoraceae generally the "hypocotyl is an assimilatory organ and is definitely modified for assimilatory purposes."

Benzoic Acid in Pinguilica. Insects which die in great numbers on the leaves of *Pinguilica vulgaris* emit no putrid odor. Experiments performed by Loew several years ago indicated the presence of some antiseptic substance. Loew and Asō (Bull. Coll. Agric. Imp. Univ.